

DRAFT QUESTIONS FOR ERPP SCIENTIFIC REVIEW PANEL

Purpose of Questions to be Addressed by the Scientific Review Panel

The objective of the Scientific Review Panel is to provide advice and recommendations on some of the key issues surrounding development of the Ecosystem Restoration Program Plan (ERPP) of the CALFED Bay-Delta Program. Questions developed to guide the discussion will focus in two primary areas: 1) evaluation of the scientific validity of the basic concepts and assumptions upon which the ERPP is based; and 2) development of advice and recommendations based on real-life experiences from other restoration programs which may serve to improve the ERPP.

Since it would be very difficult to expect scientists unfamiliar with the Bay-Delta system and its unique problems to review the entire ERPP document with multiple targets and actions and provide a meaningful review in a short time period, the questions will focus on conceptual issues of basic scientific theories and principles, ecological restoration and environmental planning. The questions will not require the Scientific Review Panel to analyze technical data nor have specific prerequisite knowledge of the problems in the Bay-Delta system. The questions are intended to challenge the Panel to draw upon personal experiences gained from working in other ecological systems and to apply general scientific concepts in making recommendations for the ERPP. The questions have been separated into several general categories to ensure that all aspects of the ERPP are incorporated into the review.

Overview of the Ecosystem Restoration Program Plan

The Ecosystem Restoration Program Plan's goal for ecosystem quality is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The foundation of the ERPP is restoration of ecological processes that are associated with streamflow, stream channels, watersheds, and floodplains. These processes create and maintain habitats essential to the life history of species dependent on the Delta. In addition, the Program aims to reduce the effects of stressors that inhibit ecological processes, habitats, and species.

The ERPP employs an integrated systems approach that aims to reverse the fundamental causes of decline in fish and wildlife populations. A systems approach will recognize the natural forces that created historic habitats and use these forces to

help regenerate habitats. The Bay-Delta ecosystem is a complex living system sustained by innumerable interactions that are physical, climatic, chemical, and biological in nature, both within and outside of the geographic boundaries of the Delta. The central theme of the ERPP is the recognition that truly durable and resilient populations of all fish and wildlife inhabiting the Bay and Delta require, above all else, the rehabilitation of ecological processes throughout the Central Valley river and estuary systems and watersheds.

Organization of the ERPP

The ERPP is separated into three volumes to organize and present material in a cohesive, yet comprehensive manner.

Volume I: Visions for Ecosystem Elements presents the visions for ecological processes and functions, fish and wildlife habitats, species, and stressors that impair the health of the processes, habitats, and species.

Volume II: Visions for Ecological Zones presents the visions for the 14 ecological zones and their respective ecological units. Each individual ecological zone vision contains a brief description of the ecological zone and units, important ecological functions associated with the zone, important habitats, species which use the habitats, and stressors which impair the functioning or utilization of the processes and habitats. Volume II also contains implementation objectives, targets, and programmatic actions which describe the ERPP approach to improving the ecological health of the zone and its contribution to the health of the Delta. Rationale are also contained in Volume II which clarify, justify, or support the targets and programmatic actions.

Volume III: Visions for Adaptive Management provides the ERPP approach to adaptive management and contains the proposed plans for indicators of ecological health, a monitoring program to acquire and evaluate the data needed regarding indicators, and program of focused research to acquire additional data needed to evaluate program alternatives and options, and the approach to phasing the implementation of the ERPP over time.

Questions regarding the planning approach of the ERPP.

Background

The goal of the Ecosystem Restoration Program Plan is to implement actions which guide the restoration of ecological health to the Bay-Delta ecosystem. The

ERPP proposes to achieve this goal by utilizing a planning approach which guides the realization of conceptual goals into actions. The planning approach of the ERPP includes development of visions, implementation objectives, targets, and programmatic actions.

Visions - A vision is a statement of what the ERPP seeks to accomplish with the implementation objectives, targets, and programmatic actions for an ecological process, habitat, species or species group, stressors, or geographical unit. The vision statements included in the ERPP provide technical background to increase understanding of the ecosystem and its elements. Two types of vision statements are included in the ERPP: visions for ecosystem elements and visions for ecological zones. An ecosystem element vision addresses an individual ecological process, habitat, species or species group, or stressor, while an ecological zone vision addresses the integration of ecological processes, habitats, species, and stressors within a clearly delineated geographical area. Cumulatively, the visions also provide detailed descriptions of the ecosystem and its elements as they will look and function after restoration is accomplished.

Implementation Objectives - An implementation objective is a specific, detailed description of what the ERPP strives to maintain or achieve for an ecosystem element. Implementation objectives are not intended to change over time. Indicators are identified to track the progress towards the implementation objectives. Cumulatively, the indicators and implementation objectives describe the vision of ecological health for the ecosystem.

Targets - A target is a qualitative or quantitative statement of an implementation objective. Targets are something to strive for but may change over the life of the program with new information and progress, or may vary according to the configuration of storage and conveyance in all alternatives. Targets may include a range of values or a narrative description of the proposed future value of an ecosystem element. Targets are to be set upon realistic expectations, must be balanced against other resource needs and must be reasonable, affordable, cost-effective and practicably achievable.

The intent of the ERPP is to restore ecosystem health by achieving the implementation objectives; targets are flexible tools to guide the effort. The level of implementation for each target will be determined or adjusted through adaptive management. Targets are categorized according to the three levels of certainty: 1) targets that have sufficient certainty of success to justify full implementation in accordance with program priorities and phasing; 2) targets which will be implemented in stages with the appropriate monitoring and evaluation to judge benefits and successes; and 3) targets for which additional research, demonstration and evaluations

are needed to determine feasibility or ecosystem response.

Programmatic Actions - A programmatic action is physical, operational, legal, or institutional change or alternative means to achieve a target. Numerous site-specific actions will be implemented to fulfill the programmatic actions based on a process of adaptive management.

Questions

1. To what extent is the general planning approach described in the ERPP appropriate and adequate to meet the ecosystem quality objective of the CALFED Bay-Delta Program? How does this approach differ from other restoration efforts with which you are familiar? What lessons can be learned from other restoration programs? Are there elements of the ERPP planning approach that are unnecessary? Are there elements missing that can improve the process?

2. Is the relationship between targets and implementation objectives clearly defined? How could the relationship be improved?

Questions regarding the scope of the ERPP.

Background

The ERPP has been created to address ecosystem quality problems manifest in or closely linked to the CALFED Bay-Delta problem scope. The problem scope is defined by the legally defined Delta and the Suisun Bay and Marsh areas. To restore ecological health to the problem scope, the ERPP will implement actions within a larger solution scope, the Study Area of the ERPP. The Study Area of the ERPP is defined by the Sacramento River and San Joaquin River, its upper watersheds, the Bay-Delta, the South San Francisco Bay, and the nearshore Pacific Ocean. The type and level of implementation of actions of the ERPP will vary geographically within the Study Area.

Within the Study Area, the ERPP has identified 14 Ecological Zones where the majority of restoration actions will occur. The Ecological Zones, based on watershed boundaries, are each characterized by a predominant physical habitat type and species assemblage. The Ecological Zones include the Delta, Suisun Bay and Marsh, North San Francisco Bay, the Sacramento River, the San Joaquin River, and their tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. The other regions within the Study Area, the upper watershed areas above major dams, the South San Francisco Bay watershed, and the nearshore

Pacific Ocean, are addressed at a programmatic level.

A tiered approach has been used to develop ecosystem restoration targets and actions within the ERPP Study Area. The geographic regions within the ERPP Study Area receive varying levels of specificity and emphasis depending on the ability of actions to directly affect problems in the Delta. This approach of tiering actions is an attempt to effectively address problems that are manifest in the Delta problem scope; the ERPP will not address every ecological problem in the Bay-Delta ecosystem. Tiered emphasis does not reflect a priority setting scheme, rather it clarifies the CALFED responsibility to restore ecological health of the Delta and displays where and the degree to which actions need to be implemented. The tiering is an assessment of the number and types of actions identified in the ERPP that need to be implemented to restore ecological health.

The following describes the tiering of the level of actions among the five geographic regions designated within the solution scope of the ERPP:

Sacramento-San Joaquin Delta - The legally defined Delta is comprised of all four Ecological Units of the Sacramento-San Joaquin Delta Ecological Zone and the Suisun Bay and Marsh Ecological Unit of the Suisun Marsh/North San Francisco Bay Ecological Zone. The approach in the Delta Ecological Zones and Units differs from the approach in the remainder of the Ecological Zones and Units in the following two ways:

- Extensive focus on habitat including specific targets and programmatic actions.
- Inclusion of targets for listed species which may have a broad distribution in the ERPP Study Area but are manifest in the Delta as a "problem."

Sacramento and San Joaquin Rivers, Tributary Watersheds, and North San Francisco Bay - The CALFED approach for the Ecological Units and Zones outside the legally defined Delta is to restore important ecological processes, habitats, and species to address problems manifest in the Delta. Generally, the species list is confined to fish species, particularly anadromous fishes.

Upper Watersheds - CALFED is supportive of watershed restoration programs and efforts within the upper watersheds which result in measurable benefits to the Delta. The ERPP has developed nonspecific targets and programmatic actions for the upper watersheds which are designed to encourage local watershed planning and management efforts.

South San Francisco Bay Watershed - CALFED is supportive of watershed restoration programs and efforts within the South San Francisco Bay area. South Bay programs and projects must be closely linked to alleviation of problems that are manifest

in the Delta as a problem. The ERPP has not developed targets or programmatic actions for this area.

Nearshore Pacific Ocean - The nearshore Pacific Ocean is included in the solution area. The ERPP has not developed any targets or programmatic actions that directly address habitat conditions in the ocean. The ERPP has developed targets and programmatic actions to encourage improved harvest management and regulations.

Questions

3. What are the conceptual strengths and weaknesses of pursuing this approach of tiering of actions? In your experience, under what circumstances would restoration of ecological processes or habitat beyond the ERPP's focused Ecological Zones (the uppermost areas of tributary watersheds, the South San Francisco Bay and the nearshore ocean) result in measurable benefits to the Delta itself?

Questions regarding the process of adaptive management.

Background

Information regarding causes and solutions related to restoration of ecological health of the Bay-Delta system is in many cases incomplete or unknown. The difficulties and uncertainties of ecosystem restoration call for an implementation strategy that is flexible and can accommodate and respond to new information. The foundation of the ERPP implementation strategy is adaptive management. Adaptive management is a process of testing alternative ways of meeting objectives and adapting future management actions according to what is learned. Adaptive management involves implementing the actions most likely to achieve ecosystem management goals given the existing state of knowledge. The ERPP has proposed an approach to adaptive management which includes identification of indicators of ecosystem health, comprehensive monitoring of indicators to measure improvement over time, focused research, and phasing of actions.

Questions

4. To what extent is the general adaptive management approach described in the ERPP appropriate and adequate to achieve the implementation objectives? How does this approach differ from other adaptive management efforts, and what lessons can be learned? Are there elements of the adaptive management process of the ERPP that are unnecessary? Are there elements missing that can improve the process?

*Questions regarding the process of phasing.***Background**

Phasing is the logical sequence of implementing restoration actions to achieve CALFED goals as effectively as possible. Phased implementation is comprised of a multistage priority strategy and an evaluation of critical pathways and action dependencies which assist in identifying and sequencing the implementation of ERPP restoration actions. Early phases of the program will include restoration of ecological processes and habitats that are most important for endangered species recovery, reduction of stressors that affect threatened and endangered species, and other actions that may reduce conflicts between beneficial uses in the system. As restoration progresses and threats to endangered species are reduced or eliminated, restoration efforts will expand work toward the broader issue focus of restoring ecological health.

The balancing and priority for implementation and funding of ecosystem recovery projects will be based on a hierarchy designed to ensure the greatest level of ecosystem resilience against future disturbance, and to support self-sustaining populations that require the least amount of human intervention possible. The hierarchy for ecosystem elements emphasizes 1) ecological processes, 2) habitats, and 3) species.

The phased implementation program proposes the following:

- Short-term implementation of ecosystem restoration demonstration projects (e.g., through Category III and related programs), including stressor reduction measures, to help threatened populations begin recovering and to test the viability and effectiveness of targets and actions;
- Coordinated monitoring, evaluation, and reporting of the results of recovery efforts and the status of ecological indicators in the Bay-Delta and other zones; and
- Adaptive management of each successive phase of ERPP implementation, including pragmatic adjustments to ecosystem targets, funding priorities, and restoration techniques to ensure that public and private resources are well spent and complement other related efforts.

Questions

5. Can you comment on our approach or recommend a method to achieve proper phasing of actions that incorporates scientific uncertainty and biological urgency?

6. Multiple actions will be needed to achieve the implementation goals. Some of these actions may conflict to varying degrees, while other actions may interact to provide synergistic benefits. Based on your experience, are there any specific elements or types of actions in the ERPP which are likely to conflict with each

other? Do you have any suggestions for actions which would optimize the probability of synergistic benefits?

Questions regarding indicators of ecosystem health.

Background

A comprehensive suite of indicators is essential to:

- explicitly translate broad goals into measurable performance parameters that encompass most or all of the significant characteristics of the ecological system;
- decrease the dependence of the definition of success of the program onto any single indicator; and
- provide guiding information for long-term adaptive management strategies.

The ERPP uses a suite of indicators to track the effectiveness of the implementation objectives and assess ecological performance at several ecological scales. Indicators are direct measures of ecosystem performance for each parameter identified in the implementation objectives. The ERPP describes each indicator with a metric (what will be measured) and how the metric relates to the implementation objective parameter.

Questions

7. To what extent do the implementation objectives adequately describe a vision of ecological health? Will the indicators selected provide a reasonable definition of ecological health?

Questions regarding the setting of targets.

Background

A target is a qualitative or quantitative statement of an implementation objective. Targets are something to strive for but may change over the life of the program with new information and progress, or may vary according to the configuration of storage and conveyance in all alternatives. Targets may include a range of values or a narrative description of the proposed future value of an ecosystem element. The intent of the ERPP is to restore ecosystem health by achieving the implementation objectives; targets are flexible tools to guide the effort. The level of implementation for each target will be determined or adjusted through adaptive management.

In developing restoration targets, three different approaches were utilized: 1) historical pre-disturbance conditions; 2) diagnostic and prescriptive indicators; and 3) historical reference period incorporating existing disturbances conditions. The first

approach sets targets based on historical pre-disturbance reference conditions. A limitation to this approach is that appropriate reference periods are difficult to select, and in many cases existing conditions have been altered so drastically that restoration to a pre-disturbance condition is infeasible. The second perspective involves setting diagnostic goals to define how the ecosystem should function; identification of diagnostic indicators, implementation of prescriptive measures to achieve the diagnostic goals, and identification of prescriptive indicators. The third approach sets targets based on recent reference periods with healthy ecosystem conditions that supported substantial populations of target species.

Questions

8. Based on your experience, is the hybrid approach developed by the CALFED Program a reasonable method for setting restoration targets? Are there flaws in this approach? How have other programs set restoration targets? How can we improve this process?

Questions regarding the scientific foundation of the ERPP.

Background

As stated previously, the goal for ecosystem quality in the CALFED Program is to improve aquatic and terrestrial habitats and improve the ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animals species. The ERPP is based on the foundation that restoration of ecological processes and functions associated with streamflow, stream channels, watersheds and floodplains are necessary to create or maintain habitats essential to the life history of species dependent on the Delta. Additionally, the ERPP proposes to reduce the effects of stressors in the system that impair ecological processes, habitats, and species.

Questions

9. One of the most debated issues involves the restoration of streamflow necessary to support basic ecological processes and functions. What methods or approaches would you suggest to determine the flow characteristics (including frequency of occurrence, length of duration, quantity of discharge, and others, if applicable) of the hydrograph that serve to support basic ecological processes and functions which sustain aquatic ecosystems? Would these be applicable to the Bay-Delta ecosystem?

Questions regarding the outcomes of the ERPP.

Background

Anthropogenic actions have irreversibly changed the Bay-Delta ecosystem. The changes include destruction or degradation of habitats, alteration of the hydrologic regime, introduction of exotic species, chemical contamination, and other problems.

Questions

- 10. Given the irreversible changes to the Bay-Delta system, are the implementation objectives of the ERPP reasonable? What irreversible changes have occurred in other systems, and how have those affected restoration efforts?**
- 11. Does the ERPP identify and incorporate all of the requirements necessary for implementation of a successful long-term restoration program? Based on your experience and review of the ERPP, how can the ERPP be strengthened?**